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**Degradation study of the  $\text{ZrNiH}_{1.5}$  system**

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The ZrNi hydride has been assessed as reversible hydrogen storage material in actuators of gas gap heat switches for applications involving hydride compressors in closed-cycle Joule-Thomson sorption cryocoolers. Three  $\text{ZrNiH}_x$  samples have been cycled between 280 K ( $\text{ZrNiH}_{1.5}$ ) and 450 K ( $\text{ZrNiH}_{1.47}$ ) for more than 20,000 cycles to evaluate the hydride phase stability and durability for conditions simulating device operation. Changes in the hydrogen absorption and desorption were evaluated by measuring the pressure and temperature dynamic relationship during each cycle and by x-ray diffraction methods. No significant traces of degradation were observed although disproportionation had been seen previously for  $\text{ZrNiH}_x$  heated above 570 K. The resistance of the present samples to degradation is primarily attributed to the lower desorption temperature during cycling.

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